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AN ADDRESS

ON

A BETTER AGRICULTURE

AND

HOW TO GET IT

DELIVERED BY

PROF. JOHN HAMILTON

BEFORE THE MEETING OF

THE PENNSYLVANIA STATE BOARD OF AGRICULTURE

HELD AT

Harrisburg, Pa., January 22 and 23, 1908.

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A BETTER AGRICULTURE AND HOW TO GET IT.

BY PROF. JOHN HAMILTON, *Farmers' Institute Specialist, Office of Experiment Stations, United States Department of Agriculture, Washington, D. C.*

The crop yield of the United States has reached enormous proportions. The recent report of the Secretary of Agriculture, in speaking of cereals, announces that in the year 1907 the corn crop was 2,553,732,000 bushels; the wheat crop, 625,576,000 bushels; oats, 741,521,000 bushels; barley, 147,192,000 bushels; rye, 31,566,000 bushels; rice, 21,412,000 bushels, and buckwheat, 13,911,000 bushels. The farm value of the cereals for the year is estimated at \$2,378,000,000. Added to the cereal crops are hay, cotton, sugar and tobacco, and the enormous income from the dairy, poultry and livestock interests, making a grand total of addition to the national wealth from agriculture alone of \$7,412,000,000. These figures represent quantities of produce and an income of wealth altogether beyond our comprehension.

In the face of such figures how is it possible to justify the expenditure of millions of money, and the employment of thousands of skilled experts to secure a better agriculture, to improve that which has already grown to dimensions beyond our ability to comprehend?

Upon the proceeds of agriculture about 35 per cent. of our population are dependent for their living. Before, however, the products of the year can be enjoyed there must first be expended vast sums for rent of land and buildings, implements, labor, fertilizers, taxes and other expenses. Whatever is left is then available for the maintenance of the agricultural population, and for addition to their accumulation of surplus wealth. Accordingly, the aggregate income of a nation, or an individual is not of itself conclusive evidence of unbounded prosperity. The cost may be greater than the income, and the individual be left at the end of the year worse off than at its beginning.

I have thought that it might be interesting and perhaps instructive to take some of the items of our production and analyze them with a view to discovering their precise status as contributors to the general prosperity of the country and to the wealth of farming people. In dealing with the great problems of agriculture it is necessary to follow to some extent the methods of the chemical analyst and deal with units or small areas. The chemist in undertaking to discover the truth respecting the composition of a substance does not analyze the entire mass, but selects a sample, and divides and sub-divides it until but a small quantity is finally selected, and with this he conducts his investigation. The individual farmer and the land that he tills correspond in this instance to the chemist's sample. The various operations, crops, animals and soils

with which he deals are the component parts which exhibit the true condition of the business. The abundance, average condition, cost of production and degree of perfection of the product show at least approximately, the condition and profitableness of the industry as a whole.

WHEAT PRODUCTION.

Perhaps no single crop is grown more universally throughout the United States than wheat. From the northernmost States to the Gulf, and from the Atlantic Coast to the Pacific, every State in the Union reports a greater or less acreage of this cereal. Inasmuch as quite accurate data extending back through many years are at hand respecting the products of this crop, it is possible to ascertain with considerable accuracy and definiteness the actual conditions under which it is produced.

In the past ten years the annual wheat crop of the United States ranged from 522,229,505 to 735,260,970 bushels. The average annual production, however, for the ten years from 1897 to 1906, was 631,181,626 bushels. The average yield per acre in the United States for the decade 1897 to 1906 as given by the report of the Department of Agriculture for 1906 was 13.8 bushels, and the average annual yield from 1871 to 1906 was 12.69 bushels per acre. The averages per acre according to periods were as follows: 1871 to 1876, 11.70 bushels; 1877 to 1886, 12.51 bushels; 1887 to 1896, 12.66 bushels; 1897 to 1906, 13.82 bushels, and the average for the entire period from 1871 to 1906 was 12.69 bushels. The annual average value of the crop for the decade, 1897 to 1906, was \$9.48, and for the entire thirty-six years from 1871 to 1906, \$10.28 per acre.*

COST OF AN ACRE OF WHEAT.

When it is remembered that the cost of production of an acre of wheat in the Eastern part of the United States is about \$12.50 but little argument is needed to show its status in the list of profitable crops in that section. While the cost of producing an acre of wheat upon the new lands of the great West, where wheat is grown as practically the only crop, is at present much less than in the older wheat districts of the East, nevertheless the fact that the entire wheat acreage of the country averaged but \$9.48 per acre for the last decade, shows that the margin of profit even under the most favorable conditions is comparatively small.

That wheat is not an exception to other cereal crops in its value per acre is seen by the Census report for 1899, which gives the average value of all of the cereals taken together at but \$8.02 per acre. When it is remembered that of the acreage of all farm crops in 1899, 63.8 per cent. were cereals, we can understand how vitally this low production affects the farming interests of the country. While it is true that some farmers receive much greater income per acre from their cereals than the average indicates, yet an equal number receive correspondingly less, so that taking the country

*Report of Department of Agriculture, 1906.

as a whole the average remuneration to the portion of the 35 per cent. of our population who grow cereal crops must from this source of necessity be very slight.

CONSUMPTION OF WHEAT.

The records show that our population consume from four to seven bushels of wheat per capita each year, depending upon the price, and the condition of the business of the country. The average consumption of wheat, however, taking all of the years between 1871 and 1906, was 5.25 bushels per capita per year. The average production of wheat during that same period was 7.31 bushels per capita, leaving 2.06 bushels as surplus, which is an average of 28.2 per cent. The actual exports for the period from 1871 to 1907 as given in the statistical abstract for 1906 were: From 1871 to 1876, 23.78 per cent. of the crop; 1877 to 1886, 29.94 per cent.; 1887 to 1896, 29.92 per cent.; 1897 to 1906, 28.58 per cent., and the average for the entire period was 28.05 per cent. It will be observed that the average pro rata for export for each period was practically uniform, although the population of the country had increased in that time from 39,555,000 to 84,154,000, or 112.75 per cent.

INCREASED ACREAGE IN WHEAT.

This is due to the fact that the acreage of wheat in the United States as given by the report of the Department of Agriculture in 1906 increased 137.19 per cent., from 19,943,893 acres in 1871, to 47,305,829 acres in 1906, or 24.44 per cent. greater than the population. In other words, it required in 36 years 27,361,936 additional acres to be put out in wheat in order to supply our increasing population and keep up the average per cent. of our export trade.

It is manifest that such an additional acreage cannot be expected in the next 36 years, for the great body of available wheat lands in the United States has been appropriated. The time will therefore come when at the present rate of production per acre our population will overtake our wheat production. As has been shown, wheat production by increasing the acreage each year, has succeeded in holding its relative position as respects population during the past 36 years, the average production per capita varying only slightly in any decade. The average production from 1871 to 1876 was 6.28 bushels per capita; from 1877 to 1886, 8.06 bushels; 1887 to 1896, 7.25 bushels; 1897 to 1906, 7.66 bushels, being a per capita average for the entire period of 7.31 bushels. During the same time the surplus for export has only varied from a minimum average of 23.78 per cent. of the crop in the six years ended 1876, to a maximum of 29.94 per cent. for the decade ended 1886 with an average for the entire period from 1871 to 1906 of 28.05 per cent.

RELATION OF WHEAT PRODUCTS TO GROWTH OF POPULATION.

If the present wheat acreage were to stand still, and the bushels per acre now grown remain constant, allowing 5.25 bushels to the individual per year, and estimating our annual crop at 631,181,626

bushels, which is the average for the past ten years, a population of 120,225,071 would consume our entire production annually. At the present rate of increase this point of complete consumption would be reached inside of 15 years.

Mr. James J. Hill, in an address delivered at the dedication of the Livestock Pavilion on the Minnesota State Fair Grounds, September 3, 1907, presented some figures respecting the increase of our population in the next 40 years that are worthy of serious attention. I quote from his address the portion relating to this point. Mr. Hill says:

"So careful an observer as Leroy Beaulieu gives the natural increase of our population as 15.2 per thousand per year. It is fair, therefore, to reckon the increase by the excess of births over deaths at 15 per cent. on the average for each decade. The additions by immigration are more variable. It is highly probable, however, that the oncoming tide will increase. Only in periods of severe depression has immigration fallen much below the half million mark for the last twenty-five years. In good or fairly good times it has gone greatly above. In the two years before 1905 it exceeded 800,000 annually, while for each of the last two years it has exceeded one million. It is a conservative estimate, therefore, to add 750,000 a year for increase of population from this source, or 7,500,000 for each decade. Computed on this basis, the population of the United States in the near future will show these totals: Population in 1910, 95,248,895; population in 1920, 117,036,229; population in 1930, 142,091,663; population in 1940, 170,091,663; population in 1950, 204,041,223."

If Mr. Hill's estimate is correct, or even approximately correct, and our population increases by the middle of this century to 204,000,000, we will need 1,071,000,000 bushels of wheat at 5.25 bushels per capita to feed our people. To produce this at 13.5 bushels per acre would require 79,259,185 acres, or 31,953,356 additional acres over that in wheat in 1906, or 67.54 per cent. addition to our present acreage. Can this increase be secured?

DIVERSIFIED FARMING.

It is very clear that the states whose agriculture is now devoted almost exclusively to growing wheat must in the near future follow diversified farming, so that instead of increasing, they will have to restrict the percentage of their wheat area as has been found necessary in all of the Eastern States. This they will be compelled to do in order that the fertility of their soils may be maintained that they may produce sufficient crops to justify their tillage. To put out on any large scale more than one-third of the land adapted to cereal crops in wheat is practically impossible in any system of agriculture that is to continue.

The census of 1900 shows that the per cent. of acres in wheat as compared with the entire cereal crop is at present less than one third. The total land in cereals, barley, buckwheat, corn, oats, rye, wheat, rice and kaffir corn in 1900 in the United States was 184,994,588 acres.

In 1880 the proportion of acreage in wheat to the entire cereal crop was 29.8 per cent.; in 1890, it was 23.9 per cent.; in 1900, it was 28.4 per cent., an average for the three decades of 27.4 per cent., or 6 per cent. less than one-third. This is significant in that this average prevails notwithstanding the fact that the great wheat States of Arizona, California, Colorado, Idaho, Minnesota, Nevada,

North Dakota, Oklahoma, Oregon, South Dakota, Utah and Washington had an average of 64.4 per cent. of acreage of cereal crops in wheat. These states have doubtless almost, or altogether, reached their maximum acreage in wheat, and will gradually reduce their area of this crop in future years. Ten states, California, Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Nebraska, New Mexico and Wisconsin, have already begun such reduction. In 1880 the percentage of acreage in wheat to the entire cereal crop in these ten states was 45.1. In 1900 this had been reduced to 32 per cent., a difference of 13.1. This same change will undoubtedly occur in all of the other great wheat producing states inside of the next three decades as the ranch system gives place to the smaller farm.

If, however, no reduction occurs and not only the present average of 27.4 per cent. of acreage of cereal crops be put out in wheat, but the area be extended to embrace full 33 1-3 per cent., it would amount to only 61,664,862 acres, or 14,359,033 acres above our present acreage, as reported by the Agricultural Department for 1906.

At the present average rate of production during the last decade, 13.8 bushels per acre, 61,664,862 acres would produce 850,975,095 bushels of wheat per year. This at 5.25 bushels per capita would support 162,090,494 persons, a population which, according to Mr. Hill's estimate, would be reached about 1938, or in 30 years.

PROVISION FOR THE FUTURE.

What are we doing to anticipate this event? We are endeavoring to extend the wheat area by reclaiming waste lands through irrigation and drainage, and the introduction of varieties adapted to districts where the fall of rain is too small to permit of the growth of the varieties hitherto in use. This is practically a continuation of the policy of extending the area in order to meet future demands. That these methods of extension must sooner or later terminate needs no demonstration.

In addition to this somewhat mechanical method there have been established agricultural colleges, agricultural experiment stations and the national and State Departments of Agriculture, together with the farmers' institutes now organized in every State. These institutions have undertaken to deal with the question of the future supply of food products for the increasing population of our country by scientific methods, through the accumulation and dissemination of information respecting the laws of growth, and the discovery of the principles that underlie profitable production. Notwithstanding the efforts of all of these agencies the average production per acre of the various crops has not been materially increased in the last 36 years. The following data taken from the report of the Department of Agriculture for 1906, and from the census of 1900, exhibit this feature:*

*Note.—Data from both of the above authorities are given in order that the extent of their differences in estimating crop production may be compared.

Average Production per acre of Five Cereal Crops, 1871 to 1906. Report U. S.
Dept. Agriculture, 1906.

Crop.	1871 to 1876.	1877 to 1886.	1887 to 1896.	1897 to 1906.	Average 1871 to 1906.
Wheat,	11.70	12.51	12.66	13.82	12.69
Corn,	26.68	25.06	24.05	25.40	25.30
Rye,	12.00	13.03	12.91	15.94	13.49
Oats,	27.38	27.82	25.51	30.14	27.71
Barley,	21.35	22.41	22.72	25.53	23.00

Average Production per acre of Five Cereal Crops, 1879 to 1889. Census of 1900.

Crop.	1879.	1889.	1899.	Average.	Difference from Agr. Dept. Rept.
Wheat,	13.0	13.9	12.5	13.1	+ .41
Corn,	28.1	29.4	23.1	28.5	+3.20
Rye,	10.8	13.1	12.4	12.1	-1.43
Oats,	25.3	28.6	31.9	28.6	+1.89
Barley,	22.0	24.3	26.8	24.4	+1.40

Value of Yield per Acre of Five Cereal Crops, 1871 to 1906. Report of U. S.
Dept. Agriculture, 1906.

Crop.	1871 to 1876.	1877 to 1886.	1887 to 1896.	1897 to 1906.	Average 1871 to 1906.
Wheat,	11.78	11.21	8.67	9.48	10.28
Corn,	10.96	9.90	8.58	9.75	9.79
Rye,	9.45	8.16	6.93	8.46	8.25
Oats,	9.56	8.98	7.19	9.85	8.88
Barley,	16.20	13.60	10.40	10.76	12.74

Value of Yield per acre of Five Cereal Crops, 1879 to 1899. U. S. Census
1879, 1889, 1899.

Crop.	1879.	1889.	1899.	Average.	Difference from Agr. Dept. Rept.
Wheat,	14.40	9.70	7.93	10.37	+ .09
Corn,	10.53	8.32	8.73	9.19	-1.60
Rye,	7.08	5.54	5.93	6.20	-2.05
Oats,	8.37	6.55	7.35	7.42	-1.46
Barley,	12.95	10.11	9.31	10.79	-1.95

The failure of our institutions to make a perceptible impression upon the increase in bushels per acre is not due to incapacity in dealing with the lines of work in which they are engaged, but in their insufficient number and inadequate equipment and means of support. For instance, in a State like Pennsylvania what can one institution do in the education of six millions of people in agriculture when its efforts are confined to the students in its class rooms and are limited to a few thousand dollars for equipment and employment of instruction force?

KNOWLEDGE OF AGRICULTURE MUST BE GENERAL.

It has been found that to secure an intelligent citizenship education must be general. In like manner to secure an efficient agriculture, accurate information respecting it must be put in possession of the masses of farmers, and not be confined to the fraction of less than one ten thousandeth of 1 per cent. who are able to leave home and attend an agricultural college. The instruction, to be effective in increasing crop production, will have to be extended beyond the college walls to the people out at work, and be fitted for their use.

IMPROVED METHODS OF DISSEMINATION.

If, also, anything like rapid improvement in our agriculture is to be made, it will have to be through a more substantial form of instruction than our present farmers' institutes provide, which meet only a small number of farmers for a day or two each year, and then furnish them only one or two periods of instruction of forty minutes each upon any single topic. If the mass of farmers is to be instructed in the science and mystery of agriculture the information will have to be given in some more effective way than by scattering broadcast bulletins and reports upon agricultural subjects which only the already well-to-do and educated read.

If we are to have a better agriculture, one that will expand and meet the needs of all of the generations yet to come, we must do more than increase superficial acreage; we must make each acre increase its product as the needs of mankind require. In short, we must extend our acres downward.

PRODUCTION PER ACRE.

How far this may be done is illustrated by well-authenticated instances of maximum crop production in the United States. Sixty bushels of wheat have been grown per acre; 71 bushels of barley; 254 bushels of shelled corn; 800 bushels of potatoes; 300 bushels of strawberries, and 12 tons of hay. While these are exceptional harvests, yet they illustrate the productive power of an acre of ground, and show the possibilities of agriculture in these several directions.

PRODUCTION IN FOREIGN COUNTRIES.

What can be done and has been done upon a large scale in crop production by the use of proper methods is illustrated by reports from other countries. The following figures giving the average production of wheat, rye, oats, barley and potatoes in Austria,

Belgium, France, Germany, the Netherlands, Sweden, Great Britain and Ireland for the years 1903, 1904 and 1905 compared with the average of these same crops of the United States as given in the census of 1900, show how much further advanced are their methods than those in use in this country. The average of wheat per acre in these eight foreign countries in these years was 28.42 bushels as against 12.5 bushels in the United States; rye, 24.5 as against 12.4; oats, 43.56 as against 31.9; barley, 34.9 as against 26.8; potatoes, 180.23 as against 93 bushels. This shows an average increase per acre in all of these countries above the average production of the United States of 127 per cent. for wheat; 97 per cent. for rye; 35.8 per cent. for oats; 30 per cent. for barley, and 93 per cent. for potatoes.

HOW SIMILAR INCREASE WOULD AFFECT CROPS IN UNITED STATES.

Such an addition to the crops of the United States would be equivalent to an annual increase in value of these five crops over that reported in the Census of 1900 of \$666,483,219, or 90 per cent. If the same percentage were applied to the total crop production of that year in the United States, the increase would amount to \$2,619,124,726.

If, however, instead of taking the total averages for the three years in all of the foreign countries alluded to, there are selected from them the averages of only the most productive years, a much higher percentage of increase is shown. The following table shows averages of crops per acre in five foreign countries for selected years compared with the averages of the United States in 1899.

Crop.	Great Britain.		Ireland.		Belgium.	
	Year.	Bu.	Year.	Bu.	Year.	Bu.
		Ave.		Ave.		Ave.
Wheat,	1905	33.8	1905	37.8	1904	35.1
Oats, .....	.....	.....	1905	56.9	1903	63.5
Rye, .....	.....	.....	1905	27.0	1903	34.7
Barley,	1905	35.0	1905	46.4	1904	50.7
Potatoes,	1904	234.8	1905	207.2	1904	244.3

Crop.	Netherlands.		Germany.		United States.	
	Year.	Bu.	Year.	Bu.	Year.	Bu.
		Ave.		Ave.		Ave.
Wheat,	1904	31.1	.....	.....	1899	12.5
Oats,	1903	56.3	1903	51.2	1899	31.9
Rye, .....	.....	.....	1904	24.9	1899	12.4
Barley,	1903	48.5	1903	36.3	1899	26.8
Potatoes,	1904	240.7	1905	216.7	1899	93.0

If the averages therefore are selected from the most productive years of the seven foreign countries, France, Germany, Great Britain, Ireland, Sweden, Belgium and Netherlands out of the three years, 1903, 1904 and 1905, the increase is applied to the five crops in the United States, wheat, oats, rye, barley and potatoes, as reported in the census of 1900, would represent an additional value of \$812,253,344, or 109.86 per cent., and if this percentage is applied to the entire crop production of this country it would amount to an increase of \$3,197,078,335 over the reported aggregate yield for that year.

INCREASED PRODUCTION ABROAD DUE TO IMPROVED METHODS OF DISSEMINATION.

This increased average production by foreign countries over the United States is not because of any inherent or naturally superior properties of the soil or climate abroad, but is due to the systematic methods pursued in carrying information respecting improved agricultural operations directly to the farming people.

It is a matter worthy of special note that most of the information given in these countries to farmers is through personal teaching, advice and instruction, and not through bulletins and books. This fact is most significant in that it is a radical departure from the methods pursued in the United States which has thus far depended almost solely in the dissemination of agricultural information upon the printed page, and the slow progress that has been made in agricultural improvement in the United States has no doubt been largely due to the fact that the information that the bulletins, pamphlets and other printed matter contain has not been brought through living, personal teachers directly to the attention of those whom it is specially intended to benefit.

THE IMPORTANCE OF THE LIVING TEACHER.

The movement, therefore, that looks toward the placing of the living teacher in direct contact with the tiller of the soil through the farmers' institute, the movable school of agriculture, and the itinerant advisory professor, as well as the teaching of agricultural subjects to children in the public schools is in the right direction, and is in conformity with the best practice and most successful results secured after many years of experiment in foreign countries.

METHOD IN USE IN IRELAND.

Perhaps as conspicuous an example as any of what this method of instruction may do for a country is seen in Ireland, where in 1905, the average production of wheat was 37.8 bushels per acre, and of potatoes 207 bushels per acre. The following extract from the Sixth Annual Report, 1905-06, of the Department of Agriculture and Technical Instruction for Ireland explains in detail the methods that have been adopted in that country for giving instruction in agriculture. The facts are quoted quite fully in order to show the plans used in introducing improved methods of agriculture into the every-day practice of the great mass of Irish farmers.

ITINERANT INSTRUCTION IN AGRICULTURE IN IRELAND.

“In the year 1905-06 thirty-one County Committees of Agriculture adopted the Department’s scheme of itinerant instruction in agriculture, but owing to lack of qualified candidates, only twenty-three instructors were appointed.*

“The main branches of the work of the itinerant instructor in agriculture are the delivery of lectures to farmers at rural centres during the winter months, the carrying out of agricultural experiments and demonstrations, and the visiting of farms for the purpose of giving advice to farmers. During the year under review the instructor delivered 1,169 lectures which were attended by 66,114 persons, the average attendance being about 56. The instructors also superintended the laying down of 2,082 demonstration plots, and instituted 439 experiments on the principal crops. The visits paid to farms reached the total of 8,294, representing an average of 365 for each instructor. As the visits are undertaken only at the request of the farmers concerned, their number affords an index to the place which the instructor fills with reference to the agricultural industry of the county where he is employed. A considerable portion of the instructor’s time is occupied in affording advice to farmers by letter, a course which is adopted when a personal inspection of the farm is unnecessary or not feasible at the moment.”

ITINERANT INSTRUCTION IN HORTICULTURE AND BEE-KEEPING.

Twenty-six itinerant instructors were employed by the County Committees in giving instruction in horticulture and bee-keeping.

In each of ten counties the instructor was qualified in horticulture as well as in bee-keeping; in eleven counties the instructors were not qualified in bee-keeping, and gave instruction in horticulture only; in each of four counties two instructors were employed, one being qualified in horticulture only, and one in bee-keeping only; and in one county an instructor in bee-keeping only was available.

The lectures, as in the case of other schemes of itinerant instruction, are usually arranged for the evening, when such subjects as soils, manures, vegetables, fruit and flower cultivation, plant diseases and insect pests are dealt with. The demonstrations are held either at the established plots or in the gardens and orchards, in the districts visited by the instructors, and on these occasions practical lessons are given in pruning, spraying, planting and grafting of fruit trees, vegetable culture, modern bee-keeping, etc.

During the year ended June 30, 1906, 624 lectures were delivered with an average attendance of 57, and 14,994 visits and demonstrations were given.

The establishment of several horticultural demonstration plots throughout a county as examples of proper methods of selection and cultivation of fruits, vegetables and flowers, is regarded as a feature of great educational value in the scheme. At each plot (which it is recommended should not exceed a quarter of an acre in extent) it is usual to plant apple, pear and plum trees, as well as gooseberry and current bushes. Raspberries and strawberries are also planted, and the remainder of the plot is utilized for growing vegetables, herbs and flowers. The planting is done under the super-

*There are 32 counties in Ireland.

vision of the instructor who periodically visits the plot for the purpose of directing its cultivation and conducting demonstrations. In all 108 plots of this kind were established.

The section of the scheme which is most generally appreciated is that of regulating the purchase by County Commissioners of trees in bulk, and the reselling of same at cost price to residents in the counties. Every care is taken to ensure that the trees so distributed are of good quality and free from disease. The Department's horticultural overseer in the first instance inspects the nurseries from which the Committees decide to obtain their supplies, and the advice of the county instructor is afterwards available for the purchasers.

From weekly returns furnished by the instructors, it appears that during the twelve months ended 30th September, 1906, the following varieties and quantities of trees were planted as a direct result of the operation of the scheme:

Apples	33,172
Pears	1,519
Plums	2,475
Damsons	143
Cherries	122
Gooseberries	12,457
Currants	5,233
Raspberries	5,447
Other fruits	7,091
Other trees	158,907

ITINERANT INSTRUCTION IN POULTRY-KEEPING.

Twenty-nine itinerant instructors were employed during the year and their duties as in previous years included the delivery of lectures on poultry-keeping, visiting poultry runs, and giving practical advice to poultry keepers, conducting classes on the fattening, killing, plucking, trussing and preparation of fowl for market, and on the grading, testing and packing of eggs. These classes were conducted on a more extensive scale than previously, and were of a practical nature.

The following is a summary of the work of the instructors in months ended September 30, 1906:

Number of lectures, 2,024; average attendance, 67; number of classes, 629; average attendance, 14; visits (fowl runs), 10,656.

The egg stations, from which settings of eggs of pure-bred hens and ducks were distributed at a nominal charge to residents in the counties in which the scheme operated, were largely availed of during the season extending from the first of December to the 31st of May.

The following is a summary of the number of egg-distribution and turkey stations established in each county during the year 1905-06, and the number of settings of eggs distributed: Number of egg-distributing stations, 495; settings of eggs distributed (hen), 45,726; (duck), 6,683; turkey stations, 404.

It may be interesting to mention the extent to which a demand existed for the various breeds kept at the stations, and, accord-

ingly, the following table has been prepared, showing the number of settings of eggs from each breed sold under the scheme:

Minorcas	5,584
White Leghorn	9,937
Brown Leghorn	4,095
Orpington	8,894
Plymouth Rock	6,136
White Wyandotte	4,091
Favorolle	5,988
Houdan	1,063
Indian Runner Ducks	5,443
Aylesbury Ducks	1,176

The following table shows the progress of this scheme since 1900:

Year.	Counties.	No. of meetings held.	No. of Egg Distribution Stations.		Egg Distributed.	No. of turkey stations.
			Hens only.	Hens & Ducks.		
1900-1,	4	223	.....	.....	.....	.....
1901-2,	12	1,134	36	.....	4,108	.....
1902-3,	22	2,231	220	.....	18,040	.....
1903-4,	32	3,135	346	46	40,857	181
1904-5,	30	2,662	333	129	49,181	223
1905-6,	30	2,024	315	180	52,469	414

ITINERANT INSTRUCTION IN BUTTER-MAKING.

Twenty-eight instructors were employed in twenty-four counties during the year 1905-06 in connection with the operations of the scheme of instruction in butter-making.

The practical instruction given at the meetings held at local centres has been greatly appreciated, and the demand for instruction of this nature continues to increase.

The following is a summary of the operations of the scheme during the year: Number of lectures, 328; number of daily classes of from two to four weeks' duration at each centre, 3,232 (the average attendance being nine pupils). In addition 2,477 visits of inspection were made to private dairies."

The following statement shows the number of counties in which instructors have been employed each year since the inception of the scheme:

Year.	Counties at work.
1900-1	1
1901-2	4
1902-3	11
1903-4	18
1904-5	22
1905-6	24

This report ought to be of service to those of our people in the United States who are endeavoring to secure a better agriculture for her citizens. It points the way to increased and more profitable production. It has brought the wheat crop of Ireland to 37.8 bushels per acre, rye to 27, barley to 46, oats to 57, and potatoes to 207, not to speak of the fruit, dairy and poultry industries which have all in like manner been greatly advanced.

GOVERNMENT AID.

In Ireland and in the other foreign countries work of this character is undertaken by the Government. In some countries it is conducted almost wholly under central governmental auspices. In others it is in cooperation with provincial Governments and local societies, but in every case the introduction of the system has been through central governmental initiative and control, as in England, France, Germany, Italy and other European countries, with uniformly highly beneficial results, as the agricultural production of these countries demonstrates.

In the United States we have depended largely for the dissemination of agricultural information upon bulletins and the columns of the public press. While these agencies are absolutely essential they of themselves are comparatively helpless to secure such changes as are needed in the practice of the individual farmer whose education has been limited, and whose opportunities for observation have been few.

When it is remembered that 94 per cent. of the population of the United States are restricted in their education to that given by the common schools it is little wonder that agricultural knowledge among rural people is limited largely to traditional methods. If agriculture is to be improved it is absolutely necessary that this great body of workers, 94 per cent. of our population, shall have the advantage of the discoveries of modern science along the lines of increasing production, and it is becoming very clear that there is no way by which this can be so rapidly and economically effected as through the sending of expert teachers to instruct them by meeting them at their homes. The experience of every European country has confirmed this view, and their practice for many years has been chiefly confined to this method of imparting information with the remarkable results to which attention has been called.

While this work is properly that of the several States both as to its control and operation, and would finally be lodged with them, yet in order to introduce the system and show its practicability and adapt it to the conditions which prevail in the United States, much time would be gained and many mistakes avoided if the National Government should first make an investigation of the entire field which the system is to cover. For this a corps of expert investigators could be employed to devote their entire time to the discovery and perfecting of a system suitable for use by the agricultural educational institutions of the country, in order that all of these agencies might avail themselves of the latest and best methods for teaching agricultural subjects both to classes in school and college, but most important of all, to the mass of people who can never go to the higher industrial institutions of learning. A similar body of experts could likewise be employed

to go into the several States upon invitation of the proper local authorities to demonstrate as teachers the value of the methods desired to be introduced.

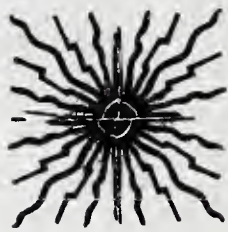
DISTRIBUTION OF INFORMATION, THE GREAT NEED OF AGRICULTURE.

There is just now a great accumulation of agricultural information stored in books, bulletins, offices and in department bureaus and reports. Like a bountiful supply of water in a reservoir, there is needed before it can be of service, distributing mains and pipes to lead it into the homes of the people who need it for daily use. Distribution of information is the most crying need in agriculture to-day; greater than investigation, research or higher education, necessary as these all are.

The several states and the National Government which established the Land Grant Colleges for instruction in agriculture and the mechanic arts, and the agricultural experiment stations for research, cannot afford to neglect to provide that the results which these institutions have discovered and will continue to discover are disseminated and put to use as rapidly as possible, and not remain unutilized for lack of conveyance to the homes and into the practice of people.

Congress by the Land Grant Act of 1862 and by its several supplements provided for higher education in agriculture, and by the Act of 1887 establishing the experiment and research stations, made provision for the discovery of new truth in agricultural science and practice. It now remains for Congress and the several States who accepted the provisions of these several Grants to complete their work in industrial education by providing for the proper distribution of the truths discovered among those who from lack of money, previous educational advantages, or because of family ties and duties are unable to go to college or to understand and intelligently apply the methods which the scientific institutions of the country have discovered as adapted to their use.

The necessity for such distribution just now in this country needs no argument to prove. It is manifest on every side, and is voiced by every intelligent farmer and by every industrial educational institution in the land. The practicability of the methods proposed for instructing agricultural people has been demonstrated through a long period and on an extended scale by every European country until there is no longer any room for doubt in this respect, and the great value of these methods to the country is manifest from a comparison of the agriculture of the United States with that of those countries that have adopted the form of distribution which employs the itinerant school, the advisory instructor, and the demonstration farm and field in the dissemination of agricultural truth.



Pen. E. 27.